

**NATIONAL WEATHER SERVICE INSTRUCTION 10-518
SEPTEMBER 8, 2004**

**Operations and Services
Public Weather Services, NWSPD 10-5**

NON-WEATHER RELATED EMERGENCY PRODUCTS SPECIFICATION

NOTICE: This publication is available at: <http://www.nws.noaa.gov/directives/>.

OPR: OS22 (M. Tew)

Certified by: OS22 (J. Lee)

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SUMMARY OF REVISIONS: This instruction supercedes NWSI 10-518, “Non-Weather Related Products Specification,” effective November 3, 2003. The following revisions were made to this instruction:

- 1) Provided additional procedural guidelines in Sections 2.4, 2.5 and Appendix A for using HYSPLIT dispersion model for familiarization and hazardous releases.
- 2) Modified Section 5 and added Appendix C to provide descriptive guidelines for the issuance of 16 new Non-Weather Related Emergency Messages.

signed

6/26/04

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Director, Office of Climate,
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Date

Non-Weather Related Emergency Products Specification

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1. **Introduction.** This procedural directive describes NWS support of hazardous releases and homeland security and non-weather related emergency products issued by the National Centers for Environmental Prediction (NCEP) and National Weather Service Weather Forecast Offices (WFOs).

2. **NWS Support of Hazardous Releases and Homeland Security.**

2.1 **Mission Connection.** Recent events including terrorist incidents, accidental releases of hazardous materials into the atmosphere, and the potential use of weapons of mass destruction have resulted in enhanced coordination and revamping of the Federal Response Plan and Federal Radiological Emergency Response Plan under the Federal Emergency Management Agency (FEMA). NWS contribution of meteorological expertise is a critical element in those plans. NWS is a major provider of weather information to emergency responders and other government agencies including observations, forecasts and warnings, and model interpretation. To enhance and protect public safety, WFOs should work closely with the emergency management community to provide decision makers with the appropriate weather information.

2.2 **Atmospheric Dispersion Models.** Although there are several public agencies involved with atmospheric transport and dispersion (ATD), NWS is the primary agency for realtime meteorological expertise and NCEP model guidance 24 hours a day. NWS has developed links with the ATD community to serve an array of users from local first responders and emergency managers to large agencies such as Environmental Protection Agency (EPA), Department of Defense (DOD), Department of Homeland Security (DHS), Federal Emergency Management Agency (FEMA), and Department of Energy (DOE).

NWS observations and forecasts including NCEP models provide input to a variety of ATD models such as the NOAA/National Ocean Service Computer-Aided Management of Emergency Operations (CAMEO) model, and NOAA/Air Resources Laboratory Hybrid Single-Particle Lagrangian Integrated Trajectory (HYSPLIT) model and Volcanic Ash Forecast Transport and Dispersion (VAFTAD) model. NCEP meteorological models as well as DOD models are used to initiate and run other ATDs such as the Defense Threat Reduction Agency (DTRA) Hazard Prediction and Assessment Capability (HPAC) model and Department of Energy Atmospheric Release Advisory Capability (ARAC) model.

2.3 **Small Scale, Short Duration Releases.** For small scale (0-10 km), short duration (less than one hour) releases, many local jurisdictions including emergency responders use CAMEO to forecast the dispersion impact. CAMEO contains a database of hundreds of chemical agents, their effects on people and wildlife, and mitigation strategies.

2.3.1 **WFO Support.** WFOs are not expected to run CAMEO, but may be asked to provide a site-specific observation or estimate (usually wind vector but may include other factors such as stability or RH). Generally responders use the nearest observation or take an on-site observation and enter the information into the model. A technical description of CAMEO is provided in Appendix A.

2.4 Large Atmospheric Release. In the event of a large atmospheric release (horizontal extent usually >10 km lasting more than an hour) of some chemical, biological or radioactive contaminant, an emergency manager may call the WFO and request atmospheric transport and dispersion information.

2.4.1 WFO Support. The senior forecaster on duty should perform the following steps when providing atmospheric transport and dispersion information:

- a. Obtain appropriate information such as location, size and/or height of release, and who/how to contact.
- b. Be prepared to provide local observation and forecast information such as: hourly observations (hourly roundup (HRR) including ASOS, as well as any local mesonets or available remote sensors), site-specific (spot) forecasts of wind, weather, temperature, RH, and stability. A commonly used stability index for dispersion is the Pasquill Stability Index shown in Figure 1.
- c. Provide HYSPLIT model output to the requestor (see section 2.5.2 for procedures to obtain HYSPLIT.) The WFO will need to remind the requestor that HYSPLIT output cannot be released to the public without the consent of the Lead Federal Agency (LFA).
- d. The HYSPLIT model is based on the Eta-12 model. If actual conditions especially wind speed and direction, are different than the Eta-12 model forecast, the forecaster should notify the requestor with the appropriate information. HYSPLIT based on the GFS model can be run on the ARL READY site in areas where the Eta-12 is unavailable or inappropriate.

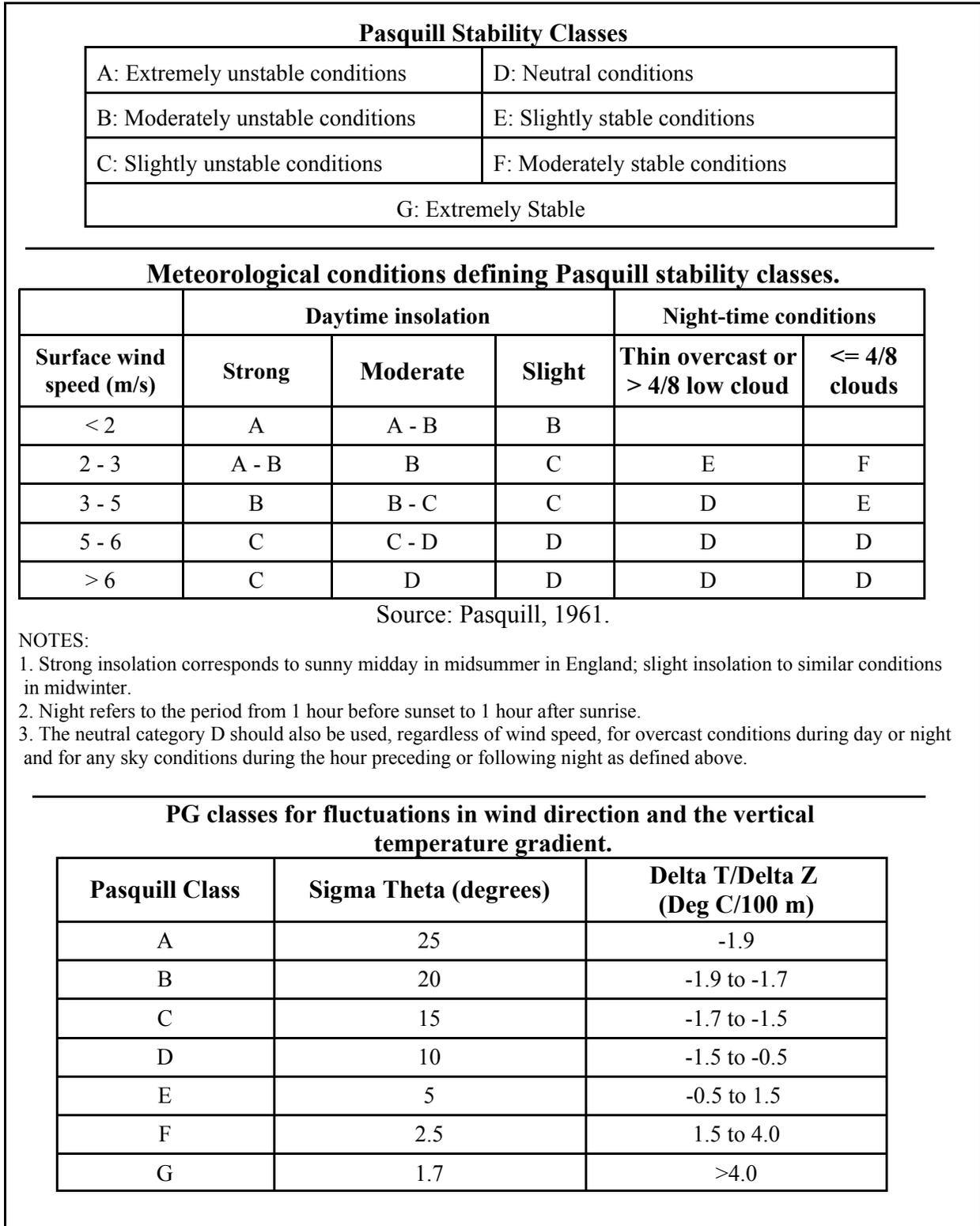


Figure 1. Pasquill Stability Index.

2.5 Procedures for using HYSPLIT Dispersion Model for Familiarization and Hazardous Releases.

2.5.1 Routine Access to HYSPLIT Forecasts. A web site hosted by NCEP provides real-time access to HYSPLIT output for about 15 changeable locations. The output is based on the 12 km Eta model that is run four times daily and posted on the NCEP web site. Contact your regional Meteorological Services Division for access.

Only sites that have submitted their individual PC IP addresses will be able to access the secured server. Additional IP addresses may be submitted to OS22- Fire and Public Weather Services Branch. To view the routine HYSPLIT forecasts on the NCEP web site:

- a. Click on the abbreviated state ID. From the table presented, find the model run time (most recent will be at the top) for links to the model output in individual and looping GIF format, Postscript files (ideal for detailed printing), and Geographical Information System (GIS) shapefiles in compressed TAR format.

2.5.2 Emergency Request for On-Demand HYSPLIT Forecast. When a WFO is informed of an atmospheric release and asked for a dispersion forecast, usually by an emergency manager or another federal agency such as the Nuclear Regulatory Commission (NRC), the forecaster should perform the following steps:

- a. Obtain appropriate information such as specific location (latitude and longitude or nearby airport), size and/or height of release, and an identifier for the incident which is mutually agreed upon by both the requestor and the SDM.
- b. Call the NCEP Central Operations (NCO) Senior Duty Meteorologist (SDM). ***The NCO SDM phone number should be included in local office emergency procedures.***
- c. After contact, the SDM will run the HYSPLIT model and post the results to the secure web site.
- d. The output will be made available on the NCEP secure web site within 10-15 minutes (see Figure 2). The requested run will be located under the section titled "On-Demand Runs" with the above mentioned incident identifier .
- e. Click on the incident identifier. From the table presented, find the model run time (most recent will be at the top) for links to the model output in individual and looping GIF format, Postscript files (ideal for detailed printing), and Geographical Information System (GIS) shapefiles in compressed TAR format.

- f. The forecaster should coordinate with the requestor how the output will be disseminated (fax, FTP, e-mail attachment, etc.).

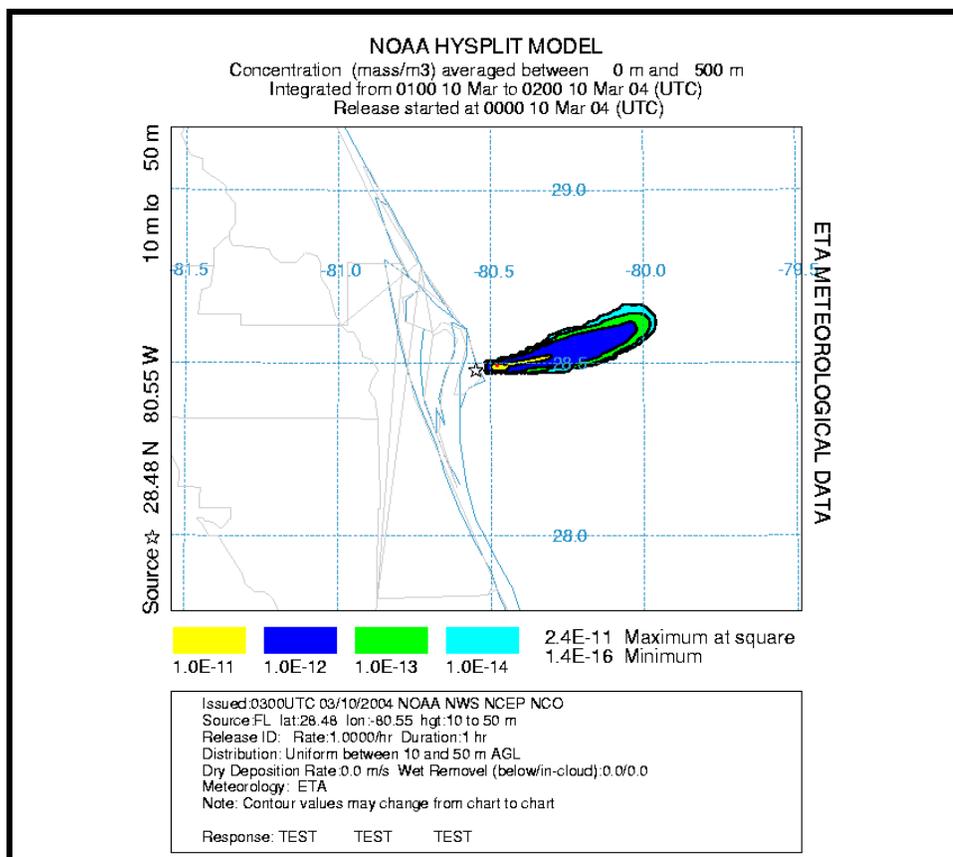


Figure 2. Sample dispersion output from HYSPLIT.

2.5.3 Alternate Access to HYSPLIT. A non-operational NOAA Air Resources Laboratory (ARL) website (<http://www.arl.noaa.gov/ready.html>) can be used by the WFO to run HYSPLIT interactively, based on several meteorological models. Users can input a number of parameters including location, source information, meteorological model, etc. The ARL site also has links to the operational NCEP web site as well as HYSPLIT training and informational materials, and weather information critical for homeland security applications. At the ARL web site perform the following steps using the defaults provided to produce a HYSPLIT forecast identical to the NCEP operational fine grid run:

- Click on ***HYSPLIT Model*** link
- Choose the ***NWS WFO Access Only*** link
- Enter the username/password (available from MSD or OS22)
- Choose ***Run Non-operational HYSPLIT***
- Under ***Dispersion Model*** click ***Compute Concentrations***

- f. Use the pull down menu for forecast data and choose the ETA 12 km model (other choices include: Eta 40 km, RUC, and GFS)
- g. Choose a **Simulation Type** (Default: **Short-range**)
- h. Specify **Deposition Type** (Default: **None**)
- i. Choose a **Location** using one of three methods: pull down menu of power plant sites, input WMO ID or Latitude/Longitude (decimal degrees), or click on map.
- j. In the model information section use all default values EXCEPT choose a value for "Total Run (Hours)," i.e. 24 hours and a "Start Time (UTC)" hour closest to the pollutant release time. Also, select **GIS shapefiles of contours** if you want GIS compatible output (there is also an option to produce these files after the model has finished).
- k. At the top of the page click **Request Dispersion Run**
- l. Note the job number displayed to view the run at a later time, then click **HYSPLIT Run Results**. The model may take up to 3-5 minutes to run and status will update automatically every 10 seconds (or hit **Reload**) until finished.
- m. View the output by clicking on **Concentration** or **Deposition** (if deposition was enabled) results at the bottom of the page for each output time or for an animation.

2.5.4 WFO HYSPLIT Testing. All WFOs with Eta-12 coverage (AWIPS grid) will run annual drills (using the routine HYSPLIT output on the secure NCEP web site without contacting the SDM) and occasional on-demand tests to ensure forecasters can access HYSPLIT output from the secure NCEP web site. Forecasters should become familiar with procedures to request and access special HYSPLIT model runs in the event of a real emergency. Output will be posted four times daily for 20 or more sites throughout the country so that WFOs will be able to select a familiar or nearby site as appropriate, or they may request that a specific site be added to the routine runs during special events or for continuing local needs. WFOs in Alaska and Pacific Regions will need to use the ARL site and GFS model for submitting and accessing HYSPLIT.

To test system viability and operational readiness, OS22 will coordinate testing periodically at specific sites with prior notification of the responsible WFO. MSDs and MICs should inform OS22 of any conflicts or local critical needs that may allow local offices to opt out of a test and may alter the schedule according to local needs. By spreading out access over a period of several weeks, delays in contacting the SDM or web site and downloading data will be minimized. However, any office may access the secure NCEP web site or the ARL web site at any time. Any problems should be noted and relayed to the SDM. Comments, concerns, issues, etc. may be sent to OS22.

3. **Fallout Winds (product category FOF)**. Fallout Winds are produced in support of interagency homeland security and emergency response activities as outlined in the Federal Response Plan. Primary users are Environmental Protection Agency (EPA) and Federal Emergency Management Agency (FEMA).

3.1 Mission Connection. NCEP Central Operations (NCO) uses program DFWINDSX within the GFS model job suite to generate bulletins of forecast Fallout Winds. In the event that

NCEP Fallout Winds are unavailable and an emergency exists, WFOs with collocated or nearby upper air sites will calculate vector winds using the sounding data as outlined in FMH#5.

3.2 Issuance Guidelines.

3.2.1 Creation Software. NCO uses the DFWINDSX program within the GFS model job suite to generate bulletins of Fallout Winds.

3.2.2 Issuance Criteria. Fallout Winds are routine, schedule-driven products and are produced twice daily based on the 0000 and 1200 UTC GFS runs.

3.2.3 Issuance Time. Fallout Winds are issued daily at approximately 0415 UTC and 1625 UTC.

3.2.4 Valid Time. Fallout wind vectors are calculated for six-hourly periods out to 24 hours from 0000 UTC and 1200 UTC.

3.2.5 Product Expiration Time. The products are valid until they are superseded by subsequent runs every 12 hours.

3.2.6 Event Expiration Time. Not applicable.

3.3 Technical Description. Fallout Winds product should follow the format and content described in this section.

3.3.1 Universal Geographic Code Type. Not applicable.

3.3.2 Mass News Disseminator Broadcast Instruction Line. Not applicable.

3.3.3 Mass News Disseminator Product Type Line. Not applicable.

3.3.4 Content. The fallout wind vectors are produced for 133 sites in four text bulletins—FDAK01 (Alaska); FDCA01 (Canada); FDHI01 (Hawaii/Pacific); FDUS01 (CONUS). Three vectors (ddss; direction and distance from site) are generated representing a triangular pattern of particle deposition expected within 3 hours of the release. A sample plot of the three vectors and the fallout pattern “footprint” is show in Figure 3.

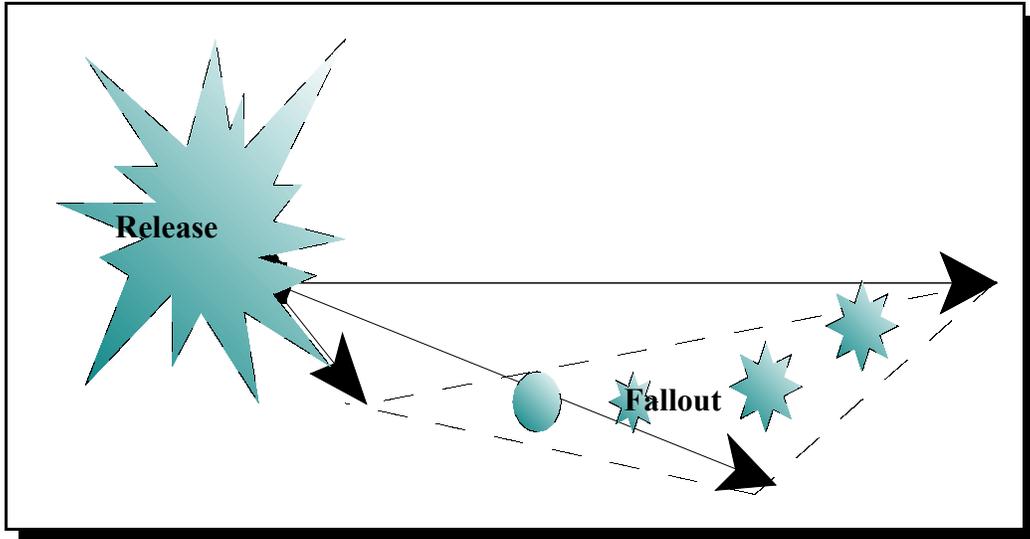


Figure 3. Footprint of Fallout (dashed line: T+3 hours)

3.3.5 Format.

<u>Product Format</u>	<u>Description of Entry</u>
FDUS01 KWNO ddhhmm FOFUS	(WMO Heading) (AWIPS ID)
UPPER WIND FALLOUT FORECAST NWS NCEP CENTRAL OPERATIONS CAMP SPRINGS MD 0351 UTC THU JUN 05 2003	(Product Name or MND) (Issuing Office) (Issuance time/date)
DATA BASED ON 211200Z region1 iii ddss ddss ddss iii ddss ddss ddss iii ddss ddss ddss (info repeats until next region) region2 iii ddss ddss ddss (etc.)	(Data Information Line) (Region the information applies) (iii = 3-letter or number site identifier) (dd = true direction, in tens of degrees clockwise from true north on the scale 01 to 36, toward which particles would fall from 100 mb level) (ss = distance, in tens of statute miles from the station, at which particles take 3 hours to fall to the ground from 100 mb (or specific level).

Table 1. Generic format for a Fallout Winds product.

When local computations are made based on the sounding data and the sounding ends below

100 mb (60,000 ft.), the ddss group will include a fifth digit hddss where h=height of the highest sounding level, in ten thousands of feet, either 30,000 ft (h=3), 40,000 ft(h=4), or 50,000 feet (h=5). If a sounding terminates below 30,000 ft., no fallout winds can be calculated.

EPA and other users plot the vectors on their own maps or input to their own models. EPA will issue appropriate public information releases when nuclear debris is injected into the atmosphere and is expected to impact the United States and/or its territories.

3.4 Updates, Amendments, and Corrections. Fallout Winds are not updated or amended. Corrections are issued when necessary.

4. **Earthquake Reports (product category EQR).** WFOs issue EQRs to disseminate macroseismic (“felt”) earthquake information to the United States Geological Survey's (USGS) National Earthquake Information Center (NEIC), the West Coast/Alaska Tsunami Warning Center (WC/ATWC), the Pacific Tsunami Warning Center (PTWC), other partners, and customers.

4.1 Mission Connection. NWS offices issue information received on earthquakes occurring within the United States, Guam, American Samoa, the Federated States of Micronesia, the Republic of Palau, and the Republic of the Marshall Islands. This information is disseminated to both the public and the United States Geological Survey’s (USGS) National Earthquake Information Center (NEIC), located in Golden, Colorado.

The NEIC collects both descriptive and specific technical information to determine the various earthquake parameters and issues statements and bulletins for earthquakes occurring both domestically and around the world. The WC/ATWC and the Richard H. Hagemeyer Pacific Tsunami Warning Center (PTWC) serve as supporting seismological observatories to the NEIC in addition to their primary function as NWS tsunami warning centers. Both are responsible for determining if an earthquake is of a magnitude with the potential to generate a tsunami, determine if a tsunami has been generated, and if so, (1) issuing appropriate warnings and (2) disseminating appropriate earthquake/tsunami information.

4.2 Issuance Guidelines. EQRs should be disseminated on the NOAA Weather Wire Service (NWWS) and Automated Weather Information Processing System (AWIPS). Unique reporting procedures are described below for NWS offices in four broad areas:

- a. WFOs in the Contiguous United States (except the West Coast) and Puerto Rico. WFOs in this area should disseminate EQRs for Mercalli Intensity IV or greater earthquakes (see Table 2 for details on the Mercalli Scale). Once more precise, quantitative seismic information is received from the NEIC it should be incorporated into an updated EQR. WFOs in the felt area of the earthquake (within their geographic area of responsibility) should broadcast EQRs on appropriate NOAA Weather Radio (NWR) transmitters.
- b. WFOs on the West Coast of the United States. Offices in this region should initially disseminate EQRs with felt information only for Mercalli Intensity IV or

greater earthquakes. Once more precise, quantitative seismic information is received from either the NEIC (for earthquakes less than 6.0 on the Richter Scale) or the WC/ATWC (EQIWOC for earthquakes 6.0 or greater on the Richter Scale) it should be incorporated into updated EQRs. WFOs in the felt area of the earthquake (within their geographic area of responsibility) should broadcast EQRs on appropriate NWR transmitters.

- c. WFOs and Weather Service Offices (WSOs) in Alaska. NWS offices in the Alaska Region should disseminate EQRs with felt information only for Mercalli Intensity IV or greater earthquakes. Preliminary EQRs should not be broadcast over NWR in coastal areas as it could trigger unnecessary evacuations. As time/workload permits, NWS offices in this region should also submit felt information to the WC/ATWC at http://pasadena.wr.usgs.gov/shake/ak/html/unknown_form.html.

NOTE: The WC/ATWC disseminates Earthquake Information Statements (EQIAKX) for earthquakes in Alaska of a magnitude 5.0 or greater on the Richter Scale. This information may be broadcast on NWR transmitters in the “felt area” as a public service. **NWS offices in Alaska will not redistribute this information in an updated EQR.**

- d. WFOs, WSOs, and Data Collection Offices (DCOs) in Pacific Region. WFOs in Hawaii and Guam; WSOs in American Samoa, the Federated States of Micronesia, the Republic of Palau, and the Republic of the Marshall Islands, and DCOs in Hawaii should only disseminate preliminary EQRs for Mercalli Intensity IV or greater earthquakes. EQRs should not be broadcast over NWR.

NOTE: PTWC disseminates Earthquake Information Statements for Hawaii (EQIHWX) for earthquakes occurring in Hawaii of a magnitude 4.5 or greater on the Richter Scale and Tsunami Information Bulletins for earthquakes 6.5 or greater in its AOR that do not produce tsunamis. This information may be broadcast on NWR transmitters in the “felt area” as a public service. **Pacific Region offices will not issue updated EQRs with this information.**

Scale	Mercalli Intensity Scale Description
I.	Not felt except by a very few under especially favorable circumstances.
II.	Felt only by a few persons at rest, especially on upper floors of buildings. Delicately suspended objects may swing.
III.	Felt quite noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing motorcars may rock slightly. Vibration like passing truck. Duration estimated.

IV.	During the day felt indoors by many, outdoors by few. At night some awakened. Dishes, windows, and doors disturbed; walls make creaking sound. Sensation like heavy truck striking building. Standing motorcars rocked noticeably.
V.	Felt by nearly everyone; many awakened. Some dishes, windows, etc. broken; a few instances of cracked plaster; unstable objects overturned. Disturbances of trees, poles, and other tall objects sometimes noticed. Pendulum clocks may stop.
VI.	Felt by all; many frightened and run outdoors. Some heavy furniture moved; a few instances of fallen plaster or damaged chimneys. Damage slight.
VII.	Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures. Some chimneys broken. Noticed by persons driving motorcars.
VIII.	Damage slight in specially designed structures; considerable in ordinary substantial buildings, with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Persons driving motorcars disturbed.
IX.	Damage considerable to specially designed structures; well-designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken.
X.	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from river banks and steep slopes. Shifted sand and mud. Water splashed (sloped) over banks.
XI.	Few, if any (masonry) structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.
XII.	Damage total. Waves seen on ground surfaces. Lines of sight and level distorted. Objects thrown upward into the air.

Table 2. Modified Mercalli Intensity (Damage) Scale of 1931.

(NOTE: This is considered to be a classical scale similar to the Beaufort Scale. Thus a more modern version has not been developed.)

4.2.1 Creation Software. EQRs should be generated in WWA or other text editor software (e.g., AFTN/MET at Pacific Region WSOs).

4.2.2 Issuance Criteria. The EQR is a non-routine, event-driven product. EQRs should be issued using the following guidelines:

- a. Earthquakes of Intensity IV or greater on the Modified Mercalli Scale (see Table 2 for details) should be reported in accordance with the provisions specified in section 4.2a-d.
- b. EQR information should be factual and validated, if possible.
- c. EQRs should be in plain language, avoiding abbreviations and local jargon and place names.
- d. NWS personnel should confirm with the NEIC that the event was an earthquake before disseminating the EQR. If desired, confirmation may be obtained by calling the NEIC duty seismologist at 303-273-8427/8428 (24-hour). Earthquake confirmation is recommended when it is not clear whether the shaking was caused by an earthquake or something else, such as quarry blast, sonic boom, etc.

4.2.2.1 Earthquakes at WFOs. In addition to EQR responsibilities outlined above, the USGS/NEIC has requested NWS offices submit a web-based earthquake report immediately (or as soon as an Internet connection can be established) to them at: <http://pasadena.wr.usgs.gov/shake/> for any Mercalli Intensity Level V (see criteria above) or greater earthquake:

The report should be submitted for earthquakes that are of sufficient strength at local NWS field offices to knock objects off shelves, displace appliances, crack glass, or be perceived as strong enough to be alarming. Such earthquakes are substantially less frequent than earthquakes that are merely felt. If the earthquake makes a strong impression on the people or significantly displaces objects in a WFO, NEIC would like the questionnaire. If there is doubt as to whether the earthquake was sufficiently strong to merit completion of a questionnaire, field personnel can assume no report is needed.

In the event of a major earthquake swarm or aftershock sequence, in which it is impractical to report every felt shock, report the stronger shocks. These would typically be no more than several a day. Although optional, NEIC requests personnel at WFOs identify themselves to lend more credence to the web-based report.

4.2.3 Issuance Time. EQRs are transmitted as soon as reliable information is received indicating an earthquake has occurred.

4.2.4 Valid Time. EQRs are valid upon transmission.

4.2.5 Product Expiration Time. The product expiration time is generally 3-6 hours after the product issuance time. The product expiration time is placed at the end of the UGC line.

4.3 Technical Description. EQRs will follow the format and content described in this section.

4.3.1 Universal Geographic Code Type. WFOs will use the (Z) form of the Universal Geographic Code (UGC). The UGC line will include the zone(s) affected.

4.3.2 MND Broadcast Line. Not applicable.

4.3.3 MND Header. The MND Headers for the EQR are “EARTHQUAKE REPORT...PRELIMINARY” and “EARTHQUAKE REPORT...UPDATED”.

4.3.4 Content. With the exceptions noted below, each EQR should have the following general elements and format depending on whether it is a preliminary or an updated report:

4.3.4.1 Preliminary Earthquake Report. Until official information can be obtained from the USGS/NEIC, WC/ATWC, or PTWC, NWS offices will send out qualitative messages:

EARTHQUAKE FELT _____ BY _____ IN _____. _____ DAMAGE _____.
(a) (b) (c) (d) (e)

- (a) VERY STRONGLY, STRONGLY, MODERATELY, WEAKLY
- (b) (single) OBSERVER, FEW, MANY, etc.
- (c) Give locality or localities
- (d) CONSIDERABLE, MODERATE, SLIGHT, NO
- (e) Give brief description of damage, e.g., CHIMNEYS BROKEN, TOWERS FELL, STRUCTURES DESTROYED, WALLS CRACKED, DISHES RATTLED, BUILDING SHIFTED, CASUALTIES.

In addition, NWS offices will add the following statement at the end of a preliminary Earthquake Report depending on their location:

CONUS:

INFORMATION RELEASED IN THIS STATEMENT IS PRELIMINARY. UPDATES... INCLUDING RICHTER SCALE MAGNITUDE...WILL BE PROVIDED AS MORE INFORMATION BECOMES AVAILABLE FROM THE NATIONAL EARTHQUAKE INFORMATION CENTER IN GOLDEN COLORADO.

Alaska and Pacific Region:

INFORMATION RELEASED IN THIS STATEMENT IS PRELIMINARY. OFFICIAL INFORMATION...INCLUDING EARTHQUAKE LOCATION AND RICHTER SCALE MAGNITUDE...WILL BE PROVIDED BY THE WC/ATWC (or PTWC, as appropriate) AS IT BECOMES AVAILABLE.

NOTE: Official information will be disseminated by the WC/ATWC or PTWC via Earthquake Information Statements. These statements will serve as the update to the preliminary EQR and may be broadcast over the NWR. Alaska and Pacific Region offices will not redistribute this information in an updated EQR.

4.3.4.2 Updated Earthquake Report. (NOTE: Applicable to only CONUS offices.) Once official quantitative information is received from the USGS/NEIC or WC/ATWC (for Washington, Oregon, and California for Richter Scale 6.0 or greater earthquakes), NWS offices should incorporate it in an updated EQR :

EARTHQUAKE FELT _____ BY _____ IN _____ . _____ DAMAGE _____ .
(a) (b) (c) (d) (e)

- (a) VERY STRONGLY, STRONGLY, MODERATELY, WEAKLY
- (b) (single) OBSERVER, FEW, MANY, etc.
- (c) Give locality or localities
- (d) CONSIDERABLE, MODERATE, SLIGHT, NO
- (e) Give brief description of damage, e.g., CHIMNEYS BROKEN, TOWERS FELL, STRUCTURES DESTROYED, WALLS CRACKED, DISHES RATTLED, BUILDING SHIFTED, CASUALTIES.

THE NATIONAL EARTHQUAKE INFORMATION CENTER IN GOLDEN COLORADO (or WC/ATWC, as appropriate) **INDICATED THE EARTHQUAKE MAGNITUDE (#) ON THE RICHTER SCALE WAS CENTERED AT** (lat/lon) **OR ABOUT** (miles) (direction) **OF** (city, state).

CONUS offices will add the following statement at the end of an updated Earthquake Report:

ANY FURTHER INFORMATION WILL BE MADE AVAILABLE WHEN IT IS RECEIVED FROM THE NATIONAL EARTHQUAKE INFORMATION CENTER IN GOLDEN COLORADO (or WC/ATWC, as appropriate).

4.3.5 EQR Generic Format.

4.3.5.1 Preliminary EQR Issued in Contiguous U.S. and Puerto Rico.

<u>Product Format</u>	<u>Description of Entry</u>
SEaaii cccc ddhhmm	(WMO Heading)
EQRxxx	(AWIPS ID)
stZ001-002-003-004-005>015-ddhhmm-	(UGC: Z & Product expiration time)
EARTHQUAKE REPORT...PRELIMINARY	(Product Name or MND)
NATIONAL WEATHER SERVICE city state	(Issuing Office)
time am/pm time_zone day mon dd yyyy	(Issuance time/date)
"EARTHQUAKE FELT _____ BY _____ IN _____. _____ DAMAGE _____."	(REQUIRED ENTRY - Refer to Section 4.3.4.1)
[Remainder of text]	
INFORMATION RELEASED IN THIS STATEMENT IS PRELIMINARY. UPDATES... INCLUDING RICHTER SCALE MAGNITUDE... WILL BE PROVIDED AS MORE INFORMATION BECOMES AVAILABLE FROM THE NATIONAL EARTHQUAKE INFORMATION CENTER IN GOLDEN COLORADO.	(REQUIRED ENTRY - End of Product, see Sect. 4.3.4.1)
\$\$	(UGC Delimiter)
Name/Initials/Forecaster ID	(Optional)

Figure 4. Generic format for a Preliminary EQR in the Contiguous U.S. and Puerto Rico.

4.3.5.2 Preliminary EQR Issued in Alaska and Pacific Region.

<u>Product Format</u>	<u>Description of Entry</u>
SEaaii cccc ddhhmm EQRxxx stZ001-002-003-004-005>015-ddhhmm-	(WMO Heading) (AWIPS ID) (UGC: Z & Product expiration time)
EARTHQUAKE REPORT...PRELIMINARY NATIONAL WEATHER SERVICE city state time am/pm time_zone day mon dd yyyy	(Product Name or MND) (Issuing Office) (Issuance time/date)
"EARTHQUAKE FELT _____ BY _____ IN _____. _____ DAMAGE _____."	(REQUIRED ENTRY - Refer to Section 4.3.4.1)
[Remainder of text]	
INFORMATION RELEASED IN THIS STATEMENT IS PRELIMINARY. OFFICIAL INFORMATION... INCLUDING EARTHQUAKE LOCATION AND RICHTER SCALE MAGNITUDE... WILL BE PROVIDED BY THE WC/ATWC (or PTWC, as appropriate) AS IT BECOMES AVAILABLE.	(REQUIRED ENTRY - End of Product, see Sect. 4.3.4.1)
\$\$	(UGC Delimiter)
Name/Initials/Forecaster ID	(Optional)

Figure 5. Generic format for a Preliminary EQR in Alaska or Pacific Region.

4.3.5.3 Updated EQR Issued in Contiguous U.S. and Puerto Rico.

<u>Product Format</u>	<u>Description of Entry</u>
SEaaii cccc ddhhmm	(WMO Heading)
EQRxxx	(AWIPS ID)
stZ001-002-003-004-005>015-ddhhmm-	(UGC: Z & Product expiration time)
EARTHQUAKE REPORT...UPDATED	(Product Name or MND)
NATIONAL WEATHER SERVICE city state	(Issuing Office)
time am/pm time_zone day mon dd yyyy	(Issuance time/date)
"EARTHQUAKE FELT _____ BY _____ IN _____. _____ DAMAGE _____."	(REQUIRED ENTRY - Refer to Section 4.3.4.2)
THE NATIONAL EARTHQUAKE INFORMATION CENTER IN GOLDEN COLORADO (or WC/ATWC) INDICATED THE EARTHQUAKE MAGNITUDE (#) ON THE RICHTER SCALE WAS CENTERED AT (lat/lon) OR ABOUT (miles) (direction) OF (city, state). [Remainder of text]	
ANY FURTHER INFORMATION WILL BE MADE AVAILABLE WHEN IT IS RECEIVED FROM THE NATIONAL EARTHQUAKE INFORMATION CENTER IN GOLDEN COLORADO (OR WC/ATWC, as appropriate).	(REQUIRED ENTRY - End of Product, see Sect. 4.3.4.2)
\$\$	(UGC Delimiter)
Name/Initials/Forecaster ID	(Optional)

Figure 6. Generic format for an Updated EQR in the Contiguous U.S. and Puerto Rico.

4.4 Updates, Amendments, and Corrections. If additional information concerning damage or injuries within the area of the reporting office becomes available within 24 hours of the time of the initial message, updated EQR(s) should be sent to NEIC with this information. NEIC issues the following specialized earthquake messages:

4.4.1 Earthquake Alert - General Message (WMO Header SEXX02 KNEC, NWS Header NECEQREQS, AWIPS Header EQREQS). An Earthquake alert is issued by the NEIC for an earthquake that has met one of the following criteria:

- (1) Richter Scale magnitude 6.5 or greater
- (2) caused or likely to have casualties or significant damage
- (3) Richter Scale magnitude 4.5 or greater within the contiguous United States

- (4) felt strongly enough in the United States to generate inquiries from the news media or public
- (5) other events determined to be newsworthy by the NEIC duty geophysicist. The product includes a descriptive summary only and is intended for the news media and general public.

- 4.4.2 Earthquake Alert - Scientific Message (WMO Header SEXX01 KNEC, NWWS Header NECEQREQB, AWIPS Header EQREQB). This is an information message about an earthquake that has met one of the following criteria: (1) magnitude 5.5 or greater, (2) caused or likely to have caused casualties or significant damage, (3) magnitude 4.5 or greater within the contiguous United States, (4) felt strongly enough in the United States to generate inquiries from the news media or public, or (5) other events determined to be of scientific interest by the NEIC duty geophysicist. The intended audience includes civil defense agencies, dam operators, power plants, railroads, insurance companies, relief agencies, schools, and scientists. The product contains the earthquake location, time of occurrence, magnitude, depth of focus, felt effects, and data used in the processing.
- 4.4.3 Quick Epicenter Determination (WMO Header SEXX03 KNEC, NWWS Header NECEQRQED, AFOS Header EQRQED). This is a global listing of earthquakes that have been located by the NEIC. The listing is issued daily and generally contains 20 to 30 events for the date 7 days prior to the current date (e.g., the July 24th bulletin contains a listing of earthquakes observed on July 17th).
- 4.4.4 Daily Summary of United States Earthquakes (WMO Header SEUS42 KNEC, NWWS Header NECEQRSUM, AWIPS Header EQRSUM). This is a listing of United States earthquakes that occurred in the last 30 hours, grouped into 6 regions: Southwest, West Central, Northwest, Eastern, Hawaii, and Alaska.

5. **Non-Weather Related Emergency Messages.** WFOs will issue non-weather related emergency messages to provide time critical, life or property saving emergency information from federal, state or local officials.

5.1 **Mission Connection.** In keeping with the expanding function of NWS dissemination systems as “all hazards” systems, the NWS allows the use of NWS dissemination systems by other government agencies, on a highly selective basis, to disseminate potential life-saving messages.

WFOs will collaborate with federal, state or local officials to develop agreements for releasing non weather-related emergency messages over NWS dissemination systems. Non-weather related emergency messages for events affecting all or a significant portion of a state should be coordinated through a single state authority, such as the public health department or emergency management agency. This coordination reduces the number of public messages, provides a more coherent service to the public, and the NWS does not have to process messages from several cities and/or counties.

5.2 Issuance Guidelines. WFOs should develop and institute authentication procedures with state and local government officials to minimize the threat of a false or inappropriate release of a non-weather related emergency message.

5.2.1 Creation Software. WFOs should use the Watch Warning Advisory (WWA) software to create non-weather related emergency messages.

5.2.2 Issuance Criteria. Messages disseminated as non-weather related emergency messages should comply with all the following criteria:

- a. PUBLIC SAFETY IS INVOLVED--Information to be disseminated will aid in reducing the loss of life or the substantial loss of property.
- b. OFFICIAL INFORMATION--The source of the information should be a government agency, federal, state, or local, whose information directly supports federal responsibilities concerning the protection of life and property.
- c. TIME CRITICAL--Event requires immediate public knowledge to avoid adverse impact.
- d. Other means of disseminating the information are not adequate to ensure rapid delivery of urgent information of an immediate threat or of significant importance to life and property.
- e. Information length and format is consistent with other NWS disseminated material.
- f. Information should be non-routine and infrequent.
- g. Information is complementary and not counterproductive to the NWS warning program.

5.2.3 Issuance Time. A non-weather related emergency message is a non-scheduled product and will be relayed at the request of federal, state or local officials over NWS dissemination systems.

5.2.4 Valid Time. A non-weather related emergency message is valid for the time designated by the requesting federal, state or local official in the text message, when appropriate.

5.2.5 Product Expiration Time. The expiration time is designated by the requesting federal, state or local official and is placed in the UGC.

5.2.6 Event Expiration Time. The event expiration time is designated by the requesting federal, state or local official in the text message, when appropriate.

5.3 Technical Description. Non-weather related emergency messages should follow the format and content described in this section.

5.3.1 Universal Geographic Code Type. WFOs in the Alaska and Pacific Regions will use the (Z) form of the Universal Geographic Code (UGC), and WFOs in the remaining regions will use the (C) form of the UGC. The UGC for statements will include the county(ies) (zones) affected by the event.

5.3.2 Mass News Disseminator Broadcast Instruction line. The Mass News Disseminator (MND) broadcast instruction line will include one of the following phrases at the request of the authorizing agency:

"BULLETIN - EAS ACTIVATION REQUESTED",
"BULLETIN - IMMEDIATE BROADCAST REQUESTED",
"URGENT - IMMEDIATE BROADCAST REQUESTED"

Note: The use of "EAS ACTIVATION REQUESTED" or "IMMEDIATE BROADCAST REQUESTED" is at the discretion of state and local EAS committees.

The use of "BULLETIN" and "URGENT" follows convention established by the print and electronic media. These terms signify levels of dissemination urgency. The NWS only uses "BULLETIN" and "URGENT" in weather-related messages, but other instructions may be used at the request of the authorizing agency. The complete list for non-weather related messages:

FLASH - Used only for world changing events, such as a Presidential assassination

BULLETIN - Used when the information is sufficiently urgent to warrant breaking into normal broadcast.

URGENT - Used when the information may wait until a stop-set to be broadcast.

REGULAR - Used when the information should be broadcast at regular news times.

HOLD - Do not broadcast at this time; may be upgraded or updated with a higher priority later.

5.3.3 Mass News Disseminator Product Type line. The Mass News Disseminator (MND) will include the MND Phrase from Table 3 that matches an appropriate event description in Appendix C. The listed AWIPS Identifier product categories (NNN) and MND Product Type Line titles intentionally mimic the NOAA Weather Radio (NWR) Specific Area Message Encoding (SAME) and Emergency Alert System (EAS) Event Code and Nature of Activation titles of the identical non-weather emergency messages.

AWIPS NNN	MND Product Type Line	AWIPS NNN	MND Product Type Line
ADR	Administrative Message	HMW	Hazardous Materials Warning
AVA	Avalanche Watch	LEW	Law Enforcement Warning
AVW	Avalanche Warning	LAE	Local Area Emergency
CAE	Child Abduction Emergency	NUW	Nuclear Power Plant Warning
CDW	Civil Danger Warning	RHW	Radiological Hazard Warning
CEM	Civil Emergency Message	SPW	Shelter In Place Warning
EQW	Earthquake Warning	TOE	911 Telephone Outage Emergency
EVI	Evacuation Immediate	VOW	Volcano Warning
FRW	Fire Warning		

Table 3. Non-weather emergency message product categories and product names.

5.3.4 Non-Weather Related Emergency Message Content.

- a. Headline. A headline statement may be included if appropriate.
- b. Information Source. The lead-in to the non-NWS message will contain the source of the information in a format consistent with the following:

"The following message is transmitted at the request of (OTHER GOVERNMENT AGENCY) (remainder of text)."
- c. Content of Text. Detailed content is obtained from the civil authority(s) requesting agency. If the authorizing agency requests EAS activation, the word count of the message should be 200 words or less. The following information will be included as appropriate:
 - 1. type of hazard
 - 2. location of hazard
 - 3. actions to be taken by affected people
 - 4. where to get additional information
- d. Where demographics demand and logistics have been preplanned, the originator may provide text in multiple languages for NWS dissemination.

5.3.5 Non-Weather Related Emergency Message Generic Format.

5.3.5.1 Relayed in the contiguous U.S. and Puerto Rico.

<u>Product Format</u>	<u>Description of Entry</u>
WOUSii cccc ddhhmm	<i>(WMO Heading)</i>
nnnxxx	<i>(AWIPS ID)</i>
stC001-002-003-004-005>015-ddhhmm-	<i>(UGC: C & Product expiration time)</i>
BULLETIN - EAS ACTIVATION REQUESTED	<i>(MND Broadcast Instruction)</i>
non-weather related emergency message	<i>(Product name or MND)</i>
state EMERGENCY MANAGEMENT AGENCY st capital st	<i>(Requesting Agency)</i>
RELAYED BY NATIONAL WEATHER SERVICE city	<i>(NWS Issuing Office)</i>
state	<i>(Issuance time/date)</i>
time am/pm time_zone day mon dd yyyy	<i>(Optional)</i>
...[Headline]...	<i>(Information Source)</i>
"The following message is transmitted at the request of (OTHER GOVERNMENT AGENCY)"	
[Remainder of text]	<i>(UGC Delimiter)</i>
\$\$	<i>(Optional)</i>
Name/Initials/Forecaster ID	

Figure 7. Generic format for a non-weather related emergency message relayed in the contiguous U.S. and Puerto Rico.

5.3.5.2 Relayed in Alaska or Pacific Region.

<u>Product Format</u>	<u>Description of Entry</u>
WOaaii cccc ddhhmm	(WMO Heading)
nnnxxx	(AWIPS ID)
stZ001-002-003-004-005>015-ddhhmm-	(UGC: <u>Z</u> & Product expiration time)
BULLETIN - EAS ACTIVATION REQUESTED	(MND Broadcast Instruction)
non-weather related emergency message	(Product name or MND)
state EMERGENCY MANAGEMENT AGENCY st capital st	(Requesting Agency)
RELAYED BY NATIONAL WEATHER SERVICE city state	(NWS Issuing Office)
time am/pm time_zone day mon dd yyyy	(Issuance time/date)
...[Headline]...	(Optional)
"The following message is transmitted at the request of (OTHER GOVERNMENT AGENCY)"	(Information Source)
[Remainder of text]	
\$\$	(UGC Delimiter)
Name/Initials/Forecaster ID	(Optional)

Figure 8. Generic format for a non-weather related emergency message relayed in the Alaska or Pacific Region.

5.4 Non-Weather Related Emergency Message Agreements.

5.4.1 Local Non-Weather-Related Emergencies Covered by Agreement. One statewide agreement with one agency should cover anticipated situations. Copies of these agreements and detailed procedures to carry out the agreements should be kept in the WFO operations area. Agreements to disseminate non-weather emergency information (including possible use of the warning alarm tones and NWR-SAME codes) will be approved by the RH.

5.4.2 Local Non-Weather-Related Emergencies Not Covered by Agreement. At times when events occur requiring the use of NWS dissemination systems by outside sources that are not covered by any agreements, the senior forecaster on duty should determine if the event presents a clear and immediate threat to lives and property in the state or the County Warning Area. If the senior forecaster determines that the threat to life and property is real and the use of NWS dissemination systems could reduce the threat, dissemination of the information, as requested by locally recognized public safety officials, should be authorized after appropriate authentication. The regional headquarters should be contacted as soon as possible afterward with details of the event and to assess the need for a new agreement or addendum to cover future similar events. Examples of situations that would fall under this category are (1) a serious chemical spill or leak,

(2) an explosion in a populated area, or (3) a dangerous nuclear or bio-hazard release, whether accidental or result of an act of terrorism.

5.5 Updates and Corrections. WFOs should release a time-critical updated non-weather related emergency message over NWS dissemination systems at the request of a federal, state or local official. No additional formatting for an updated non-weather related emergency message is required. Proofread your non-weather related emergency message prior to sending message. If typographical errors are found after transmission, correct the error and retransmit the product using the following format:

WOUSii cccc ddhhmm CCx
nnnxxx
stC001-ddhhmm-

(Where, x=A,B,C...,X)

*(Z UGC Type for non-weather
related emergency messages issued
in Alaska & Pacific Regions)*

BULLETIN - EAS ACTIVATION REQUESTED
non-weather related emergency message...**CORRECTED**
state EMERGENCY MANAGEMENT AGENCY st capital st
RELAYED BY NATIONAL WEATHER SERVICE city state
time am/pm time_zone day mon dd yyyy

CORRECTED FOR TYPOGRAPHICAL ERROR

THE FOLLOWING MESSAGE IS TRANSMITTED AT THE REQUEST OF...

APPENDIX A - Non-Weather Related Emergency Models and Product Examples

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1. **Introduction.** This section contains information and examples of models and products used for non weather related emergency events
2. **Technical Description of Atmospheric Transport and Dispersion Models (ATD).**
 - 2.1 **CAMEO - Computer-Aided Management of Emergency Operations.** CAMEO is a suite of software designed to help first responders and emergency planners plan for and quickly respond to chemical accidents. Within CAMEO, ALOHA (Areal Locations of Hazardous Atmospheres) is a computer program that uses meteorological input (usually a single point wind vector), along with physical property data from its extensive chemical library, to predict how a hazardous gas cloud might disperse in the atmosphere after an accidental chemical release. ALOHA can predict rates of chemical release from broken gas pipes, leaking tanks, and evaporating puddles, and can model the dispersion of both neutrally-buoyant and heavier-than-air gases.

ALOHA can display a "footprint" plot of the area downwind of a release where concentrations may exceed a user-set threshold level. It also displays plots of source strength (release rate), concentration, and dose over time. ALOHA accepts weather data transmitted from portable monitoring stations, and can plot footprints on electronic maps displayed in a companion mapping application, MARPLOT, as in the example below. Additional information on CAMEO/ALOHA is available at <http://response.restoration.noaa.gov/cameo/intro.html>

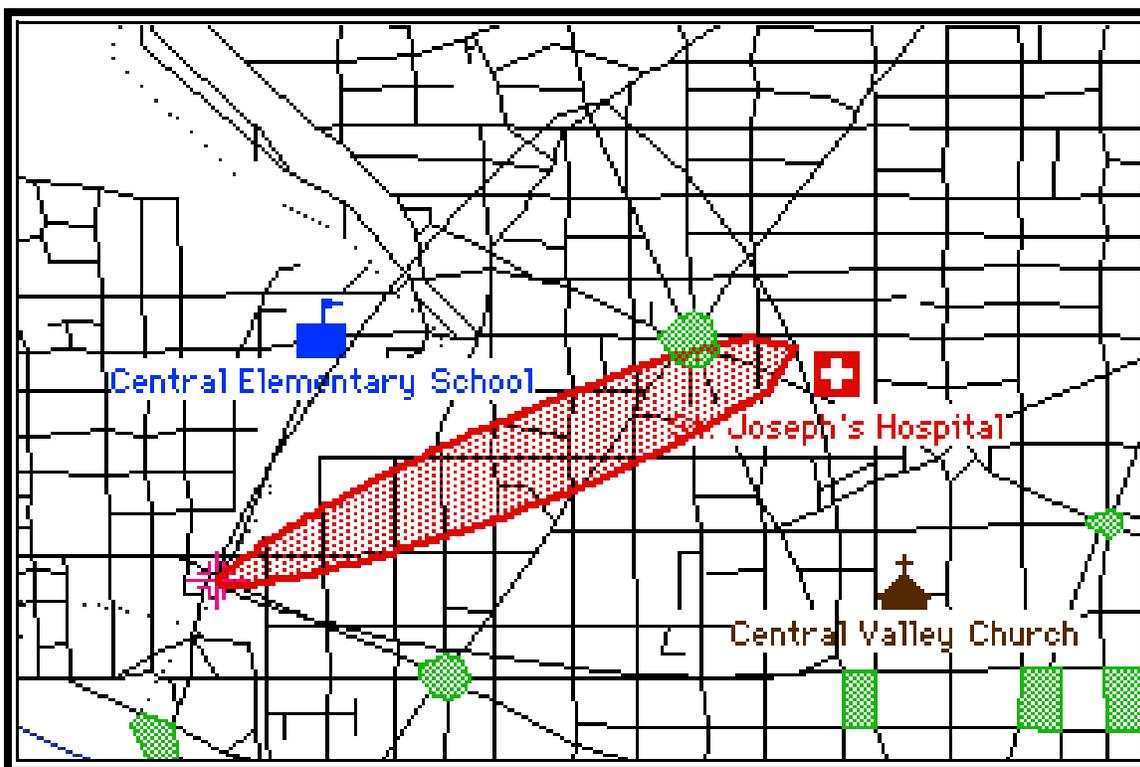


Figure A-1. Example of CAMEO/ALOHA output.

2.2 HYSPLIT - Hybrid Single-Particle Lagrangian Integrated Trajectory Model. The model, developed at the NOAA Air Resources Laboratory (ARL), is designed to support a wide range of simulations related to the long-range transport, dispersion, and deposition of pollutants. The applications can range from accidental radiological releases to the hazards presented to aircraft operations from volcanic ash eruptions, or routine air quality assessments such as those associated with emissions of anthropogenic pollutants. Simulation output results can vary from simple trajectories to more complex air concentration contour patterns. Calculations can be performed on archive or forecast meteorological data, or a combination of both.

The model calculation method is a hybrid between Eulerian and Lagrangian approaches. Advection and diffusion calculations are made in a Lagrangian framework following the transport, while concentrations are calculated on a fixed grid. The transport and dispersion of a pollutant are calculated by assuming the release of a single puff with either a Gaussian or top-hat horizontal distribution or from the dispersal of an initial fixed number of particles. The HYSPLIT approach is to combine both puff and particle methods by assuming a puff distribution in the horizontal and particle dispersion in the vertical direction. In this way, the greater accuracy of the vertical dispersion parameterization of the particle model is combined with the advantage of having fewer pollutant puffs to represent the horizontal distribution.

The model is now in operational use by the National Weather Service (NWS), with the National Centers for Environmental Prediction (NCEP) providing local forecast offices with dispersion forecasts routinely. Field forecasters regularly respond to requests from government and other emergency managers.

2.2.1 HYSPLIT Operational Support at NWS. HYSPLIT model simulations, driven by the current full resolution meteorological forecast data, are operationally supported 24x7 at NCEP. Backup/contingency operations support are in place. Outputs are posted to a secure web site, for access by NWS field forecasters and other registered users, or faxed if necessary. Two product streams are currently available:

- a. Nationwide, four times each day, linked to the Eta-12 km (backed up with GFS and MM-5 model outputs). Scenarios are produced four times each day for sample locations, for model evaluation and forecaster training.
- b. NWS Senior Duty Meteorologist (SDM) at NCEP will run HYSPLIT interfaced to the current Eta-12 predictions for specified locations, at the request of NWS field forecasters, 24x7.

In addition to GIF and PostScript, graphical outputs of NWS/NCEP HYSPLIT simulations are also available in GIS shapefile format, which can be imported into ArcView or similar GIS systems.

2.2.2 When to Use HYSPLIT. The model is well suited for quick calculations of dispersion from pollutant point sources for situations where a quick turnaround is essential. The model's performance has been evaluated by comparing the calculations for a variety of different applications to real data observations, such as observed balloon trajectories, measured air

concentrations of inert tracers, measured radioactive deposition, and satellite photographs of ash from volcanic eruptions. Various assessment studies have been conducted and summarized at <http://www.arl.noaa.gov/ss/transport/>. It is appropriate to use HYSPLIT:

- ▶ to address problems with source-to-receptor distances greater than 1/4 the resolution of the meteorological data driving the model simulation,
- ▶ to estimate source strengths based upon the ratio of the air concentration measurement to the model's unit emission air concentration prediction,
- ▶ to model the transport and dispersion of neutrally-buoyant materials, or buoyant plumes after stabilization
- ▶ to estimate air concentration or exposure over time at specific locations or areas downwind
- ▶ when temporal and/or spatial variations in meteorological conditions are expected
- ▶ when estimates of dry and/or wet deposition of the pollutant are required
- ▶ to get a forecast of plume position using the most recent NWS/NCEP forecast data.

2.2.3 When Not to Use HYSPLIT. HYSPLIT is not appropriate for:

- ▶ when the plume changes height due to non-meteorological factors such as plume rise from a large fire. If the plume rise has been constrained, for instance by a thermal inversion, then the model could be run using the inversion height as the initial height of the source.
- ▶ transport or dispersion at distances less than 500 meters (~1/4 mile) from the source
- ▶ emissions containing dense gases (flow controlled by gravity, not meteorology)
- ▶ emissions involving any chemical reactions more complex than radioactive decay if quantitative concentration estimates are required. The model can be run for all situations to infer plume transport directions and plume width estimates.
- ▶ when the plume may be diverted due to local topographic features and effects such as sea breezes, unless the local topography and effects are well represented by the meteorological model used to run HYSPLIT. Plume transport within HYSPLIT is driven only by the input meteorological data.

2.2.4 How to Run HYSPLIT. The model can be run on MS Windows PCs or UNIX workstations, or on-line via the NOAA ARL website. The Windows executables, user manual, and other documentation, can be downloaded from the NOAA ARL Real-time Environmental Applications and Display sYstem (READY) website: <http://www.arl.noaa.gov/ready/hysplit4.html>.

Registration is required to run the model on-line using forecast meteorological data or to download the HYSPLIT PC executables. Registration is open to all government, commercial, and educational institutions at no cost. Certain government organizations may be able to request high-resolution model simulations directly from the NOAA NWS. In addition, the model can be run online, non-operationally, by NWS WFOs using a special ARL website (<https://www.arl.noaa.gov/ready/hysplitnws/>), although higher resolution meteorological forecasts (Eta, NMM, etc) may be available operationally by NCEP.

2.2.5 Entering Weather Information. Gridded fields of meteorological variables are required

at regular temporal intervals. The time interval between fields should be constant for each defined grid. Meteorological data fields may be provided on a variety of different vertical coordinate systems. At a minimum, the model requires horizontal wind components, temperature, height or pressure, and the pressure at the surface. The precipitation field is required for wet deposition calculations. Meteorological data files in a format compatible for input to HYSPLIT are available through anonymous FTP from <ftp://gus.arlhq.noaa.gov/pub/>. Model calculations through the ARL READY web site automatically access all archive and forecast data files routinely saved by ARL. Access to the data from the PC version is configured in the HYSPLIT Graphical User Interface (GUI) and obtained automatically from the ARL server using FTP. Meteorological data may also be available by special arrangement with NOAA NWS and from other sources using standard GRIB decoding software provided with the model.

2.2.6 Estimating Model Parameters. On the PC, the model can be run in batch mode with simulation parameters specified in a control file or run interactively through a GUI. The GUI, which sets all the default model simulation options, is available for both MS Windows and Unix platforms. The range of model configurations is more limited for the on-line web site version. A model simulation requires, at a minimum, the emission location, time, duration, and height. Pollutant specific simulations are possible if more detailed characteristics, such as particle size, density, deposition velocity, emission rate, are known in advance. Typically, the model is run with a unit source strength emission unless more detailed information is available.

2.2.7 Typical Model Output. Two basic types of output are available: trajectories and air concentrations (Figures A-2 and A-3). Trajectories represent the transport pathway of a single pollutant particle while air concentration simulations model the transport and dispersion of a cluster of particles released over the duration of the emission. The latter therefore provides a more realistic and quantitative estimate. Post-processing graphics programs are integrated within the GUI for the display of trajectories and air concentrations as contoured time-series plots. Output averaging intervals and display heights are specified by the user. Conversion programs are available to convert the model results into files compatible with commercial GIS software, GrADS, and Vis5D.

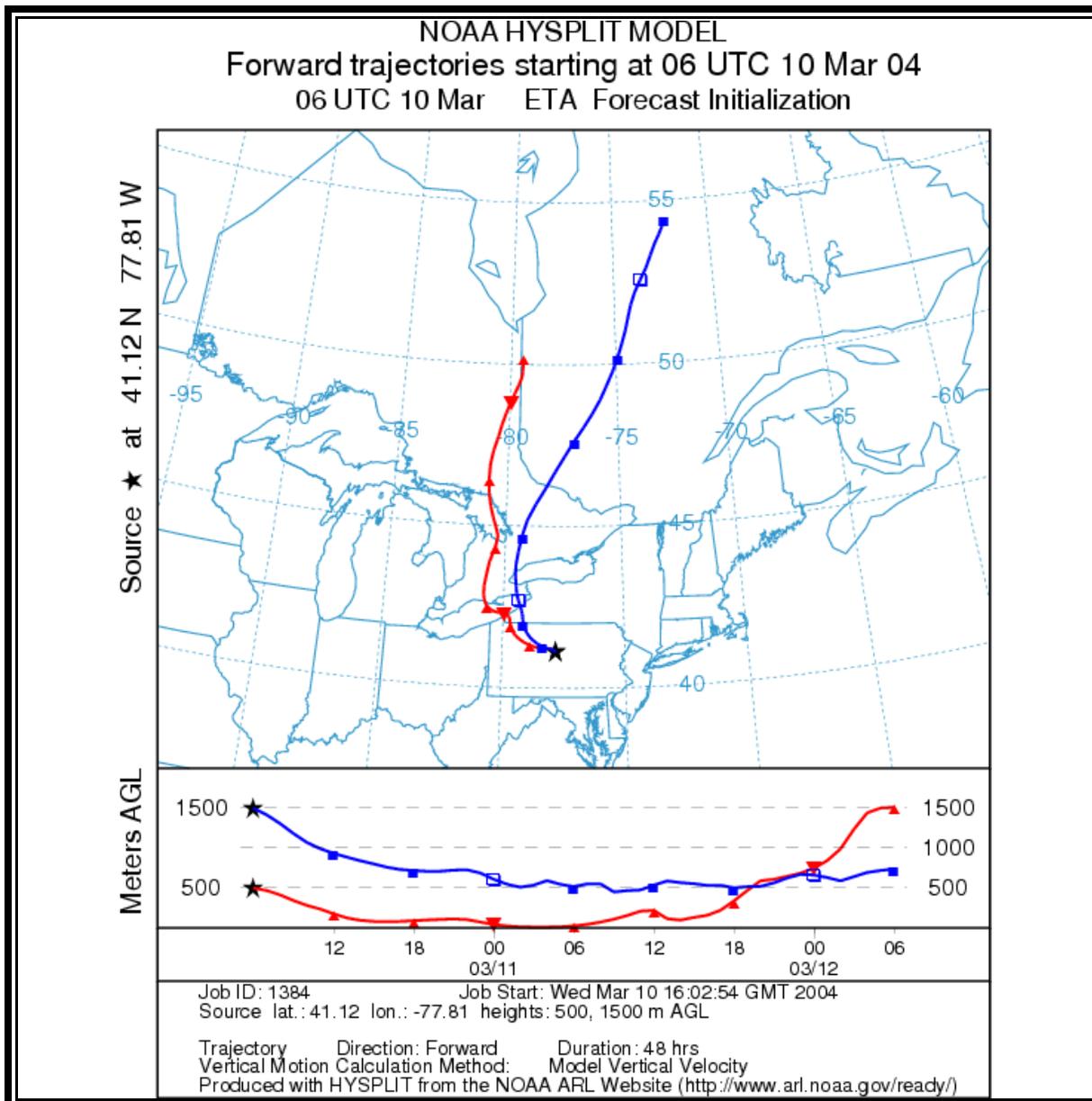


Figure A-2. Example of a HYSPLIT Trajectory.

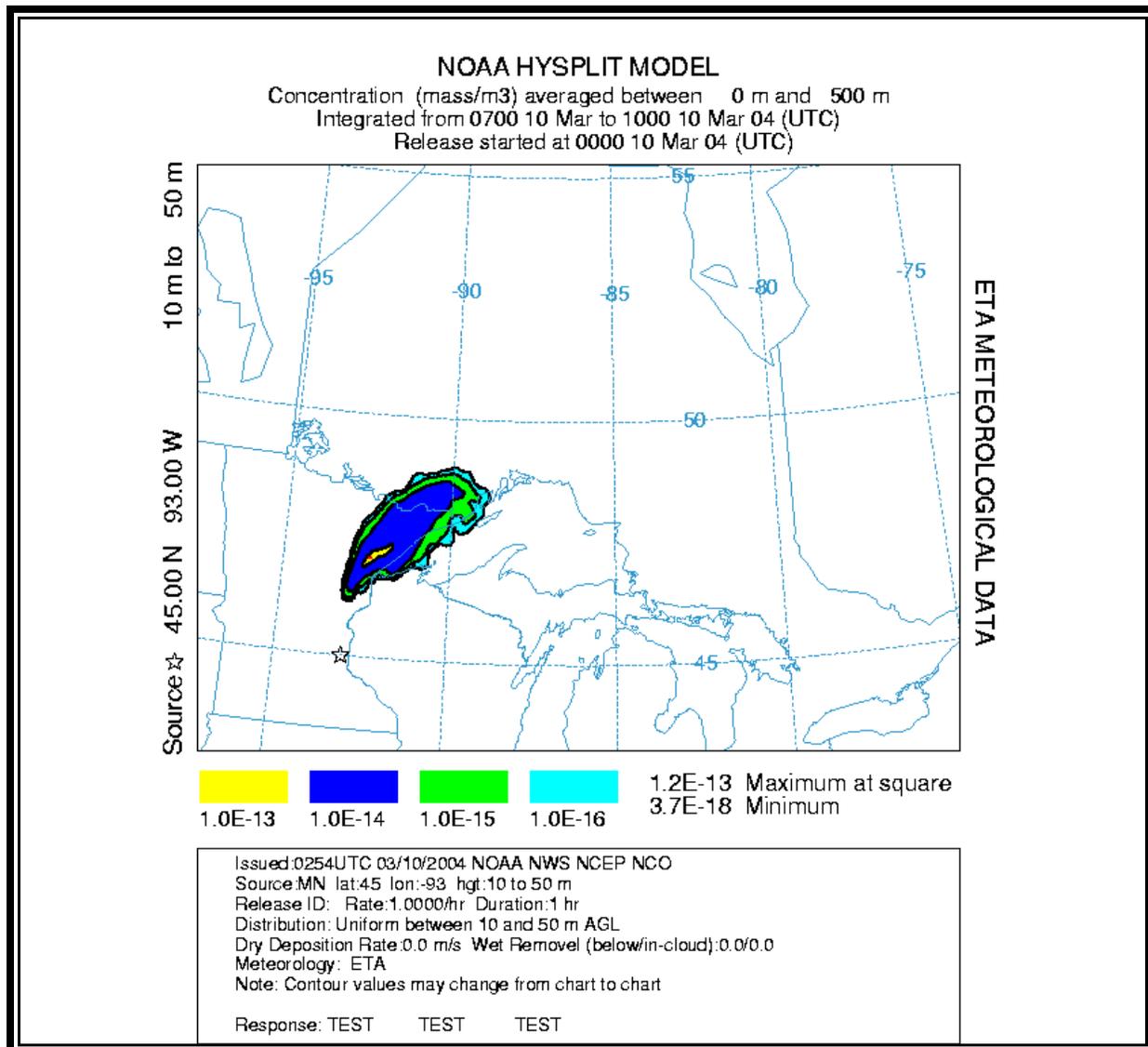


Figure A-3. Example of HYSPLIT Dispersion Plume.

The following is a description of what the output contains:

- ▶ Identification as a NOAA HYSPLIT product.
- ▶ Indicates that the air concentration is averaged vertically between the ground (0 meters) and 500 meters and the units are in mass per cubic meter (mass/m³). Since the default Homeland Security (HS) emission rate is one unit over one hour, output units can be any multiplier of the input unit. Ground-level deposition maps, if available, are identified on this line with units of mass per square meter.
- ▶ The integration period for which the time integrated concentrations apply. All times are UTC (Universal Time Coordinate or Zulu time) and are indicated by the start and end of the integration period.
- ▶ The UTC time that the release started. The default HS scenario would be a release of one hour starting at this time.

- ▶ The latitude, longitude, and height of the release. Latitude and longitude are in degrees and hundreds of degrees. Single letter abbreviations are used for East, West, North and South. Source heights are in meters and indicate the height or layer of the release. A star is used to represent the source location on the map.
- ▶ Colors used for plotting the four contour intervals and their corresponding values. If the range of values on the map is less than eight orders of magnitude then the contour intervals are at factors of 10. If the range is greater, then the contour intervals are at factors of 100. Any values smaller than the smallest concentration range indicated are not plotted on the map.
- ▶ The size of the solid red square indicates the size of the concentration grid cell.
- ▶ The time at which the forecast model was initialized at NCEP and an abbreviated name for the meteorological model.
- ▶ In this example, the yellow shaded area represents the 1.0E-13 units/m³ contour. If the actual pollutant emission rate were known, say 1.0E+7 particles, then the predicted 3-hour average air concentration in this region would be 1.0E-6 particles/m³ (1.0E-13 x 1.0E+7 = 1.0E-6).

2.2.8 User Support. More detailed information about the model may be obtained from the ARL HYSPLIT web site at: <http://www.arl.noaa.gov/ready/hysplit4.html> with additional instructions at: <http://arx-1.arx.noaa.gov/Hysplit/hysplit.htm>

Additional online training is available from COMET at:
http://meted.ucar.edu/dispersion/cam_hys/noflash.htm
<http://meted.ucar.edu/dispersion/basics/index.htm>

3. Fallout Winds product for the contiguous U.S.

FDUS01 KWNO 050351
 FOFUS

UPPER WIND FALLOUT FORECAST
 NWS NCEP CENTRAL OPERATIONS CAMP SPRINGS MD
 0351 UTC THU JUN 05 2003

DATA BASED ON 050000Z

NERN US

JFK 0617 0618 0718 BOS 0715 0617 0617 AUG 0712 0615 0615
 CAR 0708 0610 0609 PLB 0609 0611 0608 ALB 0615 0616 0615
 BUF 0610 0710 1010 IPT 0617 0717 0816 PIT 0716 0816 1017
 BAL 0718 0717 0818 CRW 0818 0918 1018 LOU 0916 1017 0914

SERN US

RIC 0716 0715 0915 HAT 0611 0612 0710 RDU 0713 0713 0911
 TRI 0815 0914 1012 BNA 0912 0911 0910 JAN 0910 0809 0709
 BHM 0910 0910 0909 ATL 0810 0910 1009 CAE 0710 0810 1008
 ILM 0712 0712 0910 JAX 0807 0909 1009 TLH 0909 0910 1010
 TPA 1006 1107 1107 MIA 1303 1404 1505 MOB 0910 0910 0809
 MSY 0911 0810 0808

S CNTRL US

HOU 0810 0809 0809 SAT 0809 0709 0710 CRP 0708 0708 0708

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BRO 0806 0707 0707 LRD 0709 0709 0609 DRT 0709 0610 0611
HOB 0708 0709 0710 AMA 0709 0710 0713 ABI 0809 0710 0710
DAL 0809 0710 0711 SHV 0809 0710 0710 MEM 0910 0909 0810
LIT 0910 0809 0711 OKC 0810 0610 0611 ALS 0813 0812 1011
DEN 0711 0810 1210 GCK 0712 0613 0713 HLC 0814 0714 0713
ICT 0913 0712 0613 MKC 0914 0813 0714 SGF 0913 0811 0712
STL 0915 0914 0813
N CNTRL US
IND 0915 1017 1016 ORD 1109 1112 1014 CLE 0813 0913 1116
FNT 1106 1107 1111 SSM 2002 1502 1105 GRB 1302 1005 0909
DBQ 1008 1012 0913 DSM 1011 0913 0713 ONL 0911 0712 0611
RAP 0908 1206 1507 ABR 0605 0506 0405 MSP 0803 0906 0808
INL 0502 0602 0803
NWRN US
GFK 0102 0202 0402 DIK 1802 1904 1705 GGW 1910 1709 1508
BIL 1713 1712 1511 GTF 1713 1612 1513 DLN 1712 1711 1611
FCA 1712 1612 1613 GEG 1711 1711 1611 SEA 1609 1608 1709
PDX 1709 1708 1708 OTH 1806 1906 1806 RBL 1805 1905 1805
LKV 1709 1808 1807 IMB 1710 1810 1608 BOI 1710 1809 1709
CPR 1309 1610 1612 BFF 0911 0909 1309
SWRN US
SLC 1611 1609 1608 PIH 1711 1710 1609 RKS 1509 1611 1610
GJT 1109 1409 1409 FMN 1012 1111 1109 ABQ 0910 0911 0910
BCE 1312 1409 1407 LAS 1406 1405 1404 ELY 1510 1608 1607
EKO 1610 1708 1708 TPH 1607 1606 1606 RNO 1707 1806 1806
SFO 1704 1804 1803 FAT 1605 1805 1704 SBA 1405 1604 1503
DAG 1405 1404 1403 SAN 1304 1304 1203 YUM 1104 1103 1003
PRC 1107 1206 1106 TUS 0904 0904 0905 ELP 0806 0707 0707
CANADA
609 0711 0713 0614
714 0606 0507 0606
731 3401 0801 1404
749 0802 0803 1004
852 0201 0300 1300
863 1905 1504 1204
872 1611 1512 1513
882 1613 1612 1613
892 1509 1609 1609

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4. **Earthquake Report Examples.**

4.1 **Initial Earthquake Report.** These examples are initial Earthquake Reports without precise quantitative information. Note the '...PRELIMINARY' on the MND line and the mandatory statement in the final section.

SEUS63 KJKL 290956
EQRJKL
KYZ044-050>052-058>060-068-069-079-080-083>088-104-106>120-291500-

EARTHQUAKE REPORT...PRELIMINARY
NATIONAL WEATHER SERVICE JACKSON KY
556 AM EDT TUE APR 29 2003

EARTHQUAKE FELT MODERATELY BY MANY IN SOUTH CENTRAL AND EASTERN KENTUCKY. NO DAMAGE HAS BEEN REPORTED.

ACCORDING TO THE USGS...THE EARTHQUAKE REGISTERED BETWEEN 4.0 TO 4.5 ON THE RICHTER SCALE...AND WAS CENTERED NEAR FORT PAYNE ALABAMA IN NORTHEAST ALABAMA. THE EARTHQUAKE LASTED FROM 5 TO 20 SECONDS.

INFORMATION RELEASED IN THIS STATEMENT IS PRELIMINARY. UPDATES... INCLUDING RICHTER SCALE MAGNITUDE...WILL BE PROVIDED AS MORE INFORMATION BECOMES AVAILABLE FROM THE NATIONAL EARTHQUAKE INFORMATION CENTER IN GOLDEN COLORADO.

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JARVIS/DUSTY

SEUS62 KGSP 290943
EQRGSP
GAZ010-017-0180-026-028-029-NCZ033>037-048>059-062>072-082-SCZ001>014-019-291500-

EARTHQUAKE REPORT...PRELIMINARY
NATIONAL WEATHER SERVICE GREENVILLE-SPARTANBURG SC
543 AM EDT TUE APR 29 2003

EARTHQUAKE FELT WEAKLY TO MODERATELY BY MANY PEOPLE ACROSS THE WESTERN CAROLINAS AND NORTHEAST GEORGIA. REPORTS HAVE BEEN RECEIVED FROM TRANSYLVANIA... RABUN... BUNCOMBE... ELBERT... HABERSHAM... GREENVILLE... SPARTANBURG... MCDOWELL AND ABBEVILLE COUNTIES. MOST REPORTS WERE THAT THE QUAKE WAS FELT WEAKLY... THOUGH IT WAS STRONG ENOUGH TO WAKE UP SEVERAL PEOPLE. THERE HAVE BEEN NO REPORTS OF DAMAGE.

INITIAL REPORTS FROM THE NATIONAL EARTHQUAKE INFORMATION CENTER IN GOLDEN COLORADO INDICATED THAT THE EARTHQUAKE WAS OF MAGNITUDE 4 TO 4.5 ON THE RICHTER SCALE. THE QUAKE OCCURRED AROUND 5 AM...AND WAS CENTERED NEAR FORT PAYNE ALABAMA IN NORTHEAST ALABAMA.

NWSI 10-518 SEPTEMBER 8, 2004

INFORMATION RELEASED IN THIS STATEMENT IS PRELIMINARY. UPDATES... INCLUDING RICHTER SCALE MAGNITUDE...WILL BE PROVIDED AS MORE INFORMATION BECOMES AVAILABLE FROM THE NATIONAL EARTHQUAKE INFORMATION CENTER IN GOLDEN COLORADO.

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MCAVOY

4.2 Updated Earthquake Report. This example is an updated Earthquake Report with quantitative information such as Richter Scale, precise location, time, etc. Note the '...UPDATED' on the MND line and the final section changes from the preliminary report, above.

SEUS62 KGSP 291045
EQRGSP
GAZ010-017-0180-026-028-029-NCZ033>037-048>059-062>072-082-SCZ001>014-019-291600-

EARTHQUAKE REPORT...UPDATED
NATIONAL WEATHER SERVICE GREENVILLE-SPARTANBURG SC
645 AM EDT TUE APR 29 2003

EARTHQUAKE FELT WEAKLY TO MODERATELY BY MANY PEOPLE ACROSS THE WESTERN CAROLINAS AND NORTHEAST GEORGIA. REPORTS HAVE BEEN RECEIVED FROM TRANSYLVANIA... RABUN... BUNCOMBE... ELBERT... HABERSHAM... GREENVILLE... SPARTANBURG... MCDOWELL AND ABBEVILLE COUNTIES. MOST REPORTS WERE THAT THE QUAKE WAS FELT WEAKLY... THOUGH IT WAS STRONG ENOUGH TO WAKE UP SEVERAL PEOPLE. THERE HAVE BEEN NO REPORTS OF DAMAGE.

THE NATIONAL EARTHQUAKE INFORMATION CENTER IN GOLDEN COLORADO HAS REVISED THE INTENSITY OF THE EARTHQUAKE UPWARD TO MAGNITUDE 4.9 ON THE RICHTER SCALE. THE QUAKE OCCURRED AT 459 AM EDT...AND WAS CENTERED AT 34.5N/85.5W OR ABOUT 15 MILES EAST NORTHEAST OF FORT PAYNE ALABAMA.

ANY FURTHER INFORMATION WILL BE MADE AVAILABLE WHEN IT IS RECEIVED FROM THE NATIONAL EARTHQUAKE INFORMATION CENTER IN GOLDEN COLORADO.

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APPENDIX B - Definitions for Non-Weather Related Emergency Terms

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1. Introduction. This section contains definitions of non-weather related emergency terms used in non-weather related emergency products.
2. Earthquake Data. Specific data and computed information about an earthquake, such as phase arrival times and amplitudes, hypocentral locations in geographic coordinates, magnitudes, etc.
3. Earthquake Magnitude. A measure of the size of an earthquake, obtained by measuring the amplitude of seismic waves on seismographs. The earthquake magnitude is related to the amount of energy released at the source of the earthquake. The first instrumental earthquake-magnitude scale was invented by Dr. Charles F. Richter.
4. FD. Abbreviation for upper-air fallout data. It is normally used in conjunction with the upper-air fallout data code.
5. Fallout. The process or phenomenon of the fallback to Earth's surface of particles contaminated with radioactive material from a radioactive cloud. The term is also applied in a collective sense to the contaminated particulate matter itself.
6. Fallout Wind Vector (FD Wind). A wind that is an integration of the appropriate forecast layer winds, integrated from the 100 mb level (about 50,000 feet) to the ground, adjusted for varying rates of fall of particles and the elevation of the station. A fallout wind vector defines the around position after 3 hours fall of a particle originally at 100 mb.
7. Fallout Wind Area. An area of the Earth's surface that is contaminated with radiological particulate matter that has fallen from high levels after 3 hours. The area is computed from fallout wind vectors using streamline analysis and other techniques. It is FEMA's responsibility to produce these fallout wind areas.
8. Macroseismic Information. Information on earthquake effects that are observed without the aid of seismic instruments, such as where the earthquake was felt, how strongly the earthquake was felt (e.g., weakly, moderately, strongly), how many people felt the earthquake (e.g., a few, many, or all), damage caused by the earthquake, and casualties caused by the earthquake (Reference Table 1, Modified Mercalli Intensity (Damage) Scale of 1931).
9. Modified Mercalli Intensity. A number between 1 and 12 that characterizes the severity of ground shaking at a given location by considering the effects of the shaking on people, man-made structures, and the landscape (see Table x). Intensities will be assigned to most communities in which the earthquake was felt. Intensity values may differ depending on effects in each community.

10. Richter Scale. Developed in 1935 by Charles F. Richter of the California Institute of Technology as a mathematical device to compare the size of earthquakes. The magnitude of an earthquake is determined from the logarithm of the amplitude of waves recorded by seismographs. Adjustments are included for the variation in the distance between the various seismographs and the epicenter of the earthquakes.

On the Richter Scale, magnitude is expressed in whole numbers and decimal fractions. For example, a magnitude 5.3 might be computed for a moderate earthquake, and a strong earthquake might be rated as magnitude 6.3. Because of the logarithmic basis of the scale, each whole number increase in magnitude represents a tenfold increase in measured amplitude; as an estimate of energy, each whole number step in the magnitude scale corresponds to the release of about 31 times more energy than the amount associated with the preceding whole number value.

APPENDIX C - Non-Weather Related Emergency Message Description Guidelines

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1. Introduction. This section provides descriptive guidelines used for the 17 non-weather related emergency events. These guidelines are adapted from documentation provided by a National Weather Service (NWS) working group and the Houston (TX) Local Emergency Communications Committee.

2. Background. The Federal Communications Commission (FCC) on February 22, 2002, adopted a Report and Order (FCC-02-64) giving local and state Emergency Alert System (EAS) committees the option of utilizing new event codes for non-weather related events. (The FCC Report and Order can be downloaded from the FCC's Electronic Document Management System (EDOCS) at: http://hraunfoss.fcc.gov/edocs_public/.)

The NWS adopted the EAS non-weather event codes as NWS Advanced Weather Interactive Processing System (AWIPS) Identifier product category codes for use in non-weather emergency text products (WMO heading WOUSii/WOAKii/WOHWii/WOMWii) to align the audio broadcast codes and text message identifiers to improve message dissemination.

3. Message Description Guidance. Most of the new event codes are self-explanatory. The NWS provides the guidance that follows in this appendix, until specific recommendations are provided by a group authorized by appropriate government agencies. Local and State Emergency Communication Committees (LECC's/SECC's) are encouraged to follow these guidelines to provide nationally consistent use of these codes across state borders. Use of specific, unambiguous code is preferred.

LECC's and SECC's can best determine which officials are authorized to request specific non-weather emergency messages and event codes. Such authority will vary by local ordinance, state law, and/or federal regulation, as will the agency names and titles of authorized officials. For example, in the State of Texas, only the governor of the state, mayor of an incorporated city, or county judge of an unincorporated area are authorized to recommend evacuation. However, in Texas any evacuation is voluntary, not mandatory or required, as may be true in other states.

A warning or watch is normally issued only once to provide initial notification (alert) of the event. A new warning or watch should be issued if the hazard or recommended public protective action(s) has expanded into another county or geographic zone, or if the valid time has been extended. All other updates or cancellations of the event should be sent as a non-emergency Administrative Message (ADR) or by other means (e.g., telephone, fax, e-mail, or media briefings) to local news media outlets.

4. Non-Weather Related Emergency Messages. This section provides the NWS recommended definitions of non-weather related events that are currently relayed by the NWS in text products and on NOAA Weather Radio (NWR) broadcasts which are available to LECC's and SECC's.

- 4.1 Administrative Message (ADR). A non-emergency message that provides updated information about an event in progress, an event that has expired or concluded early, pre-event preparation or mitigation activities, post-event recovery operations, or other administrative matters pertaining to the Emergency Alert System.
- 4.2 Avalanche Watch (AVA). A message issued by authorized officials when conditions are forecast to become favorable for natural or human-triggered avalanches that could affect roadways, structures, or backcountry activities.
- 4.3 Avalanche Warning (AVW). A warning of current or imminent avalanche activity when avalanche danger is considered high or extreme. Authorized officials may recommend or order protective actions according to state law or local ordinance when natural or human-triggered avalanches are likely to affect roadways, structures, or backcountry activities.
- 4.4 Child Abduction Emergency (CAE). An emergency message, based on established criteria, about a missing child believed to be abducted. A local or state law enforcement agency investigating the abduction will describe the missing child, provide a description of the suspect or vehicle, and ask the public to notify the requesting agency if they have any information on the whereabouts of the child or suspect.
- 4.5 Civil Danger Warning (CDW). A warning of an event that presents a danger to a significant civilian population. The CDW, which usually warns of a specific hazard and gives specific protective action, has a higher priority than the Local Area Emergency (LAE). Examples include contaminated water supply and imminent or in-progress military or terrorist attack. Public protective actions could include evacuation, shelter in place, or other actions (such as boiling contaminated water or seeking medical treatment).
- 4.6 Civil Emergency Message (CEM). An emergency message regarding an in-progress or imminent significant threat(s) to public safety and/or property. The CEM is a higher priority message than the Local Area Emergency (LAE), but the hazard is less specific than the Civil Danger Warning (CDW). For example, the CEM could be used to describe a change in the Homeland Security Alert System level in response to a terrorist threat.
- 4.7 Earthquake Warning (EQW). A warning of current or imminent earthquake activity. Authorized officials may recommend or order protective actions according to state law or local ordinance.
- 4.8 Evacuation Immediate (EVI). A warning where immediate evacuation is recommended or ordered according to state law or local ordinance. As an example, authorized officials may recommend the evacuation of affected areas due to an approaching tropical cyclone. In the event a flammable or explosive gas is released, authorized officials may recommend evacuation of designated areas where casualties or property damage from a vapor cloud explosion or fire may occur.
- 4.9 Fire Warning (FRW). A warning of a spreading wildfire or structural fire that threatens a

populated area. Evacuation of areas in the fire's path may be recommended by authorized officials according to state law or local ordinance.

4.10 Hazardous Materials Warning (HMW). A warning of the release of a non-radioactive hazardous material (such as a flammable gas, toxic chemical, or biological agent) that may recommend evacuation (for an explosion, fire or oil spill hazard) or shelter in place (for a toxic fume hazard).

4.11 Law Enforcement Warning (LEW). A warning of a bomb explosion, riot, or other criminal event (e.g. a jailbreak). An authorized law enforcement agency may blockade roads, waterways, or facilities, evacuate or deny access to affected areas, and arrest violators or suspicious persons.

4.12 Local Area Emergency (LAE). An emergency message that defines an event that by itself does not pose a significant threat to public safety and/or property. However, the event could escalate, contribute to other more serious events, or disrupt critical public safety services. Instructions, other than public protective actions, may be provided by authorized officials. Examples include: a disruption in water, electric or natural gas service, road closures due to excessive snowfall, or a potential terrorist threat where the public is asked to remain alert.

4.13 Network Message Notification (NMN). Not yet defined and not in the suite of products for relay by NWS.

4.14 911 Telephone Outage Emergency (TOE). An emergency message that defines a local or state 911 telephone network outage by geographic area or telephone exchange. Authorized officials may provide alternative phone numbers in which to reach 911 or dispatch personnel.

4.15 Nuclear Power Plant Warning (NUW). A warning of an event at a nuclear power plant classified such as a Site Area Emergency or General Emergency as classified by the Nuclear Regulatory Commission (NRC). A Site Area Emergency is confined to the plant site; no off-site impact is expected. Typically, a General Emergency is confined to an area less than a 10-mile radius around the plant. Authorized officials may recommend evacuation or medical treatment of exposed persons in nearby areas.

4.16 Radiological Hazard Warning (RHW). A warning of the loss, discovery, or release of a radiological hazard. Examples include: the theft of a radioactive isotope used for medical, seismic, or other purposes; the discovery of radioactive materials; a transportation (aircraft, truck or rail, etc.) accident which may involve nuclear weapons, nuclear fuel, or radioactive wastes. Authorized officials may recommend protective actions to be taken if a radioactive hazard is discovered.

4.17 Shelter in Place Warning (SPW). A warning of an event where the public is recommended to shelter in place (go inside, close doors and windows, turn off air conditioning or heating systems, and turn on the radio or TV for more information). An example is the release of hazardous materials where toxic fumes or radioactivity may affect designated areas.

4.18 Volcano Warning (VOW). A warning of current or imminent volcanic activity. Authorized officials may recommend or order protective actions according to state law or local ordinance.